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# Small Farms Research News

USDA, ARS, SPA

Summer 2002 1<sup>st</sup> Edition

## Field Days & Agroforestry

### Walnut Nut Production Tour

On April 3 and 4, 2002, The Center for the Advancement of American Black Walnut (The Center for American Walnuts) and Southwest Missouri Resource Conservation and Development (SW MO RC&D) hosted a tour of walnut stands on private lands and research sites in southwest MO. The tour had several co-sponsors including the Dale Bumpers Small Farms Research Center. For the last several years, The Center for American Walnuts has hosted a conference and decided this year a tour featuring specific aspects of black walnut production would be of benefit. The tour featured stops at 4 private landowners' farms and the University of Missouri's Southwest Agricultural Center at Mt. Vernon, MO. Each of the stops featured an aspect of walnut production as practiced by the landowner and related presentations by forestry/agricultural professionals. The following themes were featured on the tour's stops: 1) marketing of walnuts; 2) soil fertilization protocols; 3) use of CRP program (NRCS/USDA) to establish trees; 4) economics of walnut production; 5) importance of weed control; and 6) strengths and weakness of various walnut varieties.

The following are two specific items that I thought were note worthy. First, Brian Hammons of Hammons Products Company provided an update of the industry from the viewpoint of the major processor of eastern black walnuts. Brian indicated that Hammons was very active in creating demand for eastern black walnuts by promoting recipes using walnuts in mass media publications, among chefs, etc. According to Brian, during the fall of 2001 Hammons established 250 buy stations throughout the eastern U.S.A. and purchased approximately 37 million pounds of hulled nuts. At the Stockton, MO facility, Hammons purchased 3400 pounds of improved nuts. These improved nuts had an average cracking percentage (weight of nut meat/weight of hulled nuts) over 20% at an average price of 34 cents per pound. Brian encouraged

attendees to produce improved nuts and indicated that Hammons would continue to buy these nuts at a premium price.

Second, there are several different ways for a black walnut producer to generate income from their trees and/or expertise in walnut production at present. Of course nut sales generate income. However nuts can be sold to private and state owned tree nurseries. Nuts for seedling production typically bring \$0.75 to \$1.00 a pound. Trees of known varieties also can be used to produce scion wood for grafting to other trees. Scion wood typically fetches about \$1.00 a stick. A tree can produce 75 to 100 sticks a year. A walnut producer experienced in grafting can earn about \$5.00 per successfully grafted tree.

After the tour, attendees were invited to dinner at which Bill and Geri Hanson of Centerville, Iowa gave the post dinner presentation. The Hansons spoke of their farm where they produce walnut and process nuts to produce nut meats for direct marketing. Their approach to production and marketing is inspiring.

The Center for American Walnut and SW MO RC&D anticipate hosting another gathering for walnut producers in the spring of 2003; however details of the form and nature of this gathering have not been announced.

My last comment has nothing to do with the tour and is more of a personal commentary regarding black walnut production. Eastern black walnuts will grow quite well in western Arkansas north of Booneville-Waldron, and more landowners should consider planting these trees. Walnut trees growing in reforested regions of the Center have growth rates comparable to that found anywhere in the United States. The best growing trees at our varietal trial have growth rates that exceed most commercial plantings in MO and TN and this site is less than optimum for walnuts. Extensive harvesting of black



walnuts for timber is occurring in neighboring states. Therefore the potential for harvests in AR in the future seems probably. Despite my bullish comments regarding black walnuts above, these trees should be planted only on soils conducive to their growth. Consult with your local extension agent or forestry expert.

----- David Brauer, Agronomist

## Economics of Walnut Nut Production for Small Farmers

David Brauer and Adrian Ares

The following is a summary of our presentation during the April 2002 walnut tour sponsored by The Center for American Walnut and the SW MO RCD.

Tree growth parameters (i.e. tree height and tree DBH, diameter at breast height, 1.3 meters above ground) were measured for 55 plots located on 26 farms/research sites from October, 2001 through February 2002. Most of these plots are located in MO, but a few are located in TN, AR, NE and IA. Mean diameter of both native trees (circles) and those of named varieties (black squares) increased with age in a similar fashion, tree diameter =  $1.14 + 0.30(\text{age})$ , with  $r^2 = 0.685$  (Figure 1).

**Figure 1. Relationship between tree age and diameter for trees in data base.**

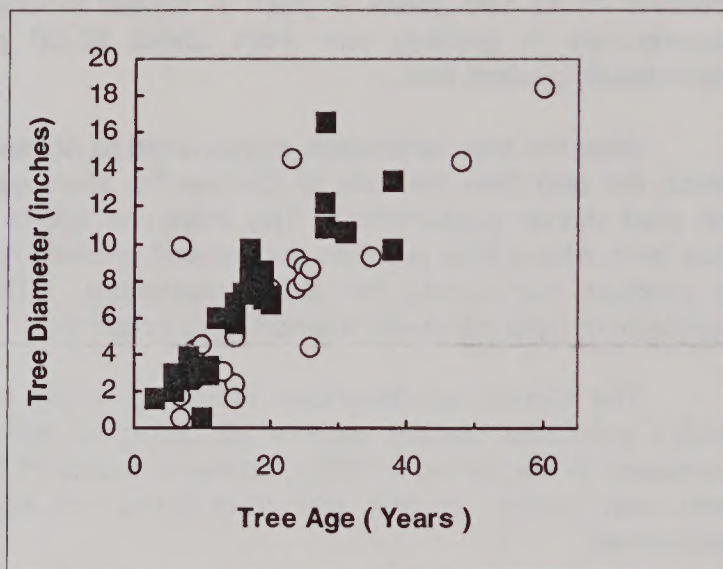


Table 1 describes a scenario of estimated growth and income potential for a stand of walnut trees. It was assumed that the above relationship between tree age and diameter represents average tree growth on an average walnut site for the economic analysis in Table 1. This analysis assumes a density of 70 trees per acre (a spacing of approximately 25 x 25 feet). This density may be too high for optimum performance for trees beyond 20 to 30 years of age. Two important features of Table 1 are: 1) nuts did not produce significant income until the trees were at least 15 years-

old; and 2) income from stands of named-varieties is greater than that of natives if the nuts from named varieties command a greater selling price based on a higher cracking percentage.

**Table 1. Predicted growth and nut yields of walnut trees.**

Tree diameter (DBH) values were estimated from the data in Figure 1. Nut yield per tree was estimated from DBH using the Equation in Kincaid, 1982 (M.S. thesis, University of Missouri-Columbia). Nut yields per acre were calculated from nut yields per tree assuming 70 trees per acre. Annual income was estimated from yields per acre assuming that nuts from native and named-variety trees would have an average cracking percentage of less than 10% and 25 % and a value of \$0.10 and \$0.25 per pound, respectively.

Tree Age	DBH	Nut Yields Per Tree	Nut Yields 70 trees/acre	Income Native	Income Varieties
Years	Inches	lbs.	lbs/acre	per acre	per acre
5	2.64				
10	4.14				
15	5.64	0.2	14	\$1.40	\$3.50
20	7.14	9.4	656	\$65.57	\$163.93
25	8.64	19.1	1336	\$133.61	\$334.03
30	10.14	28.8	2017	\$201.65	\$504.13
35	11.64	38.5	2697	\$269.69	\$674.23
40	13.14	48.2	3377	\$337.73	\$844.33

There are at least two important assumptions in the analysis in Table 1 that may not be valid. First, it is assumed that the relationship between tree diameter and nut yields in Kincaid (1982) is valid. The data used by Kincaid (1982) to develop the relationship were gathered from native trees growing in the Tennessee Valley during the 1940's. Many of the named varieties of black walnuts were selected for enhanced nut production. Therefore, selection for nut production may have altered the relationship between tree diameter and nut production; however actual data are lacking. Second, it is assumed that the relationship in Figure 1 represents the average growth potential of walnut trees. Knowledge of silviculture practices for optimum walnut production is greater today than in the past. Therefore, it may well be possible to enhance the growth of walnut trees to attain a diameter of 5 inches in a shorter time span than in the past. About 10 percent of the plots measured by Brauer and Ares had trees with mean annual increases in DBH in excess of 0.5 inches. Such a rate is 60% greater than the average in Figure 1. Trees with a mean annual increase in DBH of 0.5 inches would produce nuts earlier even if the relationship of Kincaid (1982) is valid. Growth rates in



## Dale Bumpers Small Farms Research

excess of the average performance in Figure 1 will require careful site selection for planting walnuts and good management including weed control and fertilization after planting. Research on-going at the Dale Bumpers Small Farms Research Center addresses both of these assumptions, and future results should provide additional insights into the economic potential of walnut production in the AR-MO region.

## Agroforestry programs in ARS

ARS has long history of agroforestry research. Prior to and in the aftermath of the "dust bowl" in the Great Plains, USDA and then ARS actively conducted research with regard to the design and placement of the wind breaks to reduce effects of wind erosion. The ARS location near Cheyenne WY has a series of photographs documenting the conversion of a treeless plain at the location to a forested oasis since 1917. Many of the locations that participated in wind break research have changed the emphasis of their research program as sufficient data were gathered for the successful design and establish of treed wind break.

I have had the privilege of working at the 2 ARS locations, Beaver WV and Booneville AR, that conduct agroforestry research where production/income are the primarily outcomes of the research programs. Research results from the Booneville program are a regular feature of this newsletter. The two research projects at the Beaver WV location contribute to our understanding of agroforestry systems: 1) forage-livestock research; and 2) production systems for Appalachian small farms. Within the Beaver WV livestock-forage program aspects of silvopastoral systems are being explored. With the small farms research projects, research is on-going for the management of existing farm wood-lot to produce speciality crops along with wood products. For further details on the research results from this projects please see the Beaver, WV location's web site at [www.arserrc.gov/beckley](http://www.arserrc.gov/beckley).

Several ARS locations are actively pursuing research projects related to design and functioning of wooded riparian buffers. These locations include: 1) Southeast Watershed Research Lab in Tifton, GA; 2) National Soil Tilth Research Laboratory in Ames, IO; 3) Watershed Management Research Unit in Boise, ID; 4) Environmental Quality Laboratory in Animal and Natural Resource Institute of Beltsville, MD; 5) National Sedimentation Laboratory in Oxford, MS; and 6) Pasture Systems and Watershed Management Resource Unit in University Park, PA. Most of the research conducted at these locations contribute to ARS National Program in Water Quality and Management and Manure and Byproduct Utilization

rather than the Center's project which is associated with Integrated Agricultural Systems. Each of these projects has a slightly different focus.

The National Sedimentation Laboratory focuses on the transport of soil particulates into streams and rivers. One research project is focusing on the role of plant roots to stabilize stream banks. Research at the University Park, PA location focuses on soil organic matter in various types of riparian systems on N relationships and transport of P and N to streams. Validation of the use of various models to predict total maximum daily loads is being investigated at Beltsville, MD. The Boise, ID location is examining issues related to water quality of rangeland watersheds including the role of sagebrush on stream shading. The National Tilth Lab is investigating hydrologic processes of riparian zones including wooded ones and water balance and flows in such systems.

Further details of these research projects can be found via the ARS web site at [www.ars.usda.gov](http://www.ars.usda.gov).

## Second Annual Field Day Draws A Small but Interested Group of Visitors

The Center held its second field day in as many years on Saturday June 1, 2002. Most of the two weeks prior to the field days were cool and wet. Then the sun came out the Wednesday-Thursday just before the field day. Many local farmers were busy cutting and baling hay before the next series of rainstorms due in the middle of the next week. A tour of 4 research projects at the Center was featured in the morning. Summaries of the four stops are provided below.

### **Booneville Plant Materials Center/NRCS**

Randy King, Manager

The Booneville Plant Materials Center (PMC) was established in 1987 to serve the plant material needs of the Southern Ozarks, the Arkansas River Valley, and the Ouachitas. The Center's priorities include protection and enhancement of water quality, protection and enhancement of pastureland, critical area treatment, protection and enhancement of woodland, and protection and enhancement of wildlife areas. The primary service area of the PMC (54 million acres) includes portions of Arkansas, Oklahoma, and Missouri, and covers seven major land resource areas. Much of the service area is characterized by rugged terrain (elevations from 300 to 3,00 feet), varying precipitation (36 to 53 inches) and small family farms (forage, livestock, and woodland production). In order to accomplish the mission of the PMC, studies are being conducted on native grass species (Indiangrass, big



and little bluestem, switchgrass, and eastern gamagrass) which address cultivar evaluation, environmental adaption establishment, cultivation, management, and quality parameters. Introduced species (bermudagrass) are being accessed for winter hardiness and dry-matter production. The PMC is cooperating with the Arkansas Highway and Transportation Department to address establishment methods for critical areas (8 sites). The PMC has established and maintains over a dozen off-center demonstration field plantings.

***Optimizing cow-calf management strategies on endophyte-free, infected or novel infected tall fescue***

J.M. Burke

Endophyte-infected tall fescue is widely grown in southeastern states and can lead to fescue toxicosis in ruminant animals. Forage intake often decreases, which leads to decreased condition and weight gains shortly after calving in cows and calves. Negative effects on reproduction include decreased pregnancy and calving rates, which may be due to changes in function and development of the ovary. The objective of the current research is to examine reproductive management strategies to optimize calving rates for cow-calf pairs continuously grazing tall fescue. Cows have been grazing endophyte-free, endophyte-infected, and novel endophyte-infected tall fescue for at least 18 months. Preliminary research has shown that conception rate to a synchronized timed insemination may be decreased, perhaps because asynchrony of reproductive hormones. This stop was at the 40 acre field of MaxQ, Pennington's new novel endophyte tall fescue variety, that was established in the fall of 2000. Dr. Chuck West of the University of Arkansas updated attendees regarding the release of another novel endophyte tall fescue variety this coming fall. Note: Use of a brand name does not constitute an endorsement by ARS or USDA.

***Bermudagrass Variety Trial***

Jim Miesner

Bermudagrass was brought to America in the 1500's from Africa and today has become a major summer based grass used for pasture and hay in this area. In April 2000, a multi-year field trial was initiated to determine the performance of various bermudagrasses. Now a little over two years into the test, early indications are that Midland 99 and Tifton 44 are the two most desirable entries. This judgement is based on yield, drought tolerance, hardiness and other agronomic factors. As promising new lines and/or cultivars become available, they will be entered in this test for appraisal.

***Energy Supplementation Can Cost Effectively Boost Calf Weight Gain on Bermudagrass***

Glen Aiken and Sam Tabler

Bermudagrass is widely grown in the southeastern U.S. for both grazing and hay production. Forage quality typically declines in the middle to late grazing season. Previous research has shown that crude protein can be maintained at levels above those required for calf growth if nitrogen is applied at the start and midpoint of the grazing season. However, total digestible nutrients will decline during the grazing season regardless of management. A series of grazing experiments are being conducted to determine the cost effectiveness of increasing dietary energy with daily supplementation of ground corn. An experiment conducted in 1999 and 2000 investigated the economics of supplementing steers with as much corn as 5 lbs/steer/day. Steer ADG with the 1 lb/steer/day was 15% higher than with no supplementation and 3 lb/steer /day was 40% higher than with no supplementation. The 5 lb/steer/day did not provide any additional ADG over that of the 3 lb/steer/day. The 3 lb/steer rate was most cost effective in providing additional ADG, with corn costs per additional pound of daily gain ranging from 15 cents to 47 cents as corn costs increased from 90 to 250 dollars/ton. Another grazing experiment compared steer performance between corn supplementation in the late grazing season, the entire grazing season, and a no supplementation control. Data collected in the first year (2001) of the experiment showed that supplementation over the entire grazing season (early June to late Sept.) at a rate of 2 lb/steer/day increased ADG by 40% and supplementation in the late grazing season (late July to late Sept.) increased ADG by 23%. Although higher weight gain was achieved with supplementation over the entire grazing season, corn costs per additional pound of daily gain were low (< 40 cents) for both options. These results show that corn can be fed in low enough quantities to provide cost effective increases in the ADG of stockers grazing bermudagrass pasture.

At lunch time, Dr. Keith Lusby, Chairperson of the Animal Science Department discussed how cattle would be marketed in the future. Dr. Lusby provided sound arguments why the selling of weaned calves by smaller scale cattle farmers in Arkansas probably will not change much in the next five years.

After lunch attendees had the option to tour agroforestry research projects. Summaries of these stops follow below.



**Black Walnut Variety Trial**

David Brauer

In December of 1999, an experiment was established to examine the nut production of 7 varieties of eastern black walnut. The varieties being tested are: Thomas, Surprise, Kwik Krop, Emma Kay, Sparrow, Ogden, and Sauber Wilmoth. Overall survival of trees planted in 1999 has been about 70%. Survival of Surprise and Ogden was less than that of other varieties. Tree growth has been good in many cases. Tree height after 2 growing seasons was the same for Kwik Krop, Sparrow and Thomas, averaging over 5 feet. Tree height for Surprise and Emma Kay was lower, averaging about 4 feet. Height of Ogden trees was the least, averaging less than 3 feet.

**Ice Damage in a Chronosequence of Agroforestry Pine Plantations in Arkansas, USA**

David Burner &amp; Adrian Ares

An ice storm of historical magnitude struck west central Arkansas on December 24 to 26, 2000, depositing up to 2" of ice in some areas. Ice damages pine trees by the heavy weight load imposed on the tip, branches, and trunk. The economic impact of this storm on forests was disastrous, with early estimates that 200,000 acres were affected. We measured severe (breakage) and temporary (bending) effects of the ice storm in stands of loblolly pine that were 7-, 9-, and 17-years-old. The three age classes had different types of ice damage. In the young stand, trees at wider spacing (16' alleys) tended to break while those at closer spacing (8 to 12' alleys) tended to bend. Only 1 in 10 young trees was straight after the storm, but about half were straight 8 months later. This recovery occurred faster than might have been predicted based on tree size and amount of bending. Tree size and thinning strategy were more important in influencing damage to older stands. Forests must be managed differently as they age to minimize their susceptibility to ice damage. This information will be useful for tree producers, consultants, and researchers in loblolly pine production areas that are susceptible to ice storms.

**Site Preparation for Alley Cropping Forages in an Established Loblolly Pine Stand**

Dan Pote

A silvopastoral project has been initiated at the Rogers Scout Reservation to investigate the feasibility of producing high-quality forage crops in alleys between rows of 18-year-old loblolly pine trees. In a thinning operation last summer, approximately 60% of the trees were harvested, including the complete removal of alternating tree rows to increase alley widths from 10

feet to 20 feet. Following removal of the stumps and other trees, residue remaining in alleys after the thinning operation was completed, the 20-foot alley width provides ample room for conventional farm machinery to plant, fertilize, and harvest forages. More than 4000 stumps (average diameter = approximately 10 inches) were removed from this pine stand by grinding them to a depth of 6 inches below the soil surface. Using a tractor-mounted stump grinder, the average stump removal required less than one minute, so the entire stump removal operation required approximately seven (8-hour) working days. A grader was used to windrow remaining tree residues in the center of each alley for burning. Although cool season grasses will not be planted until this fall, a tour and stump-grinding demonstration at the prepared site will be available after lunch for those who are interested.

The Center's field day would not have been possible without help from the Booneville community. Our thanks to the Booneville Industrial Development Corporation for providing lunch, the Booneville Development Corporation for providing donuts for registration, and the Booneville School District for providing busses and drivers.

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**Future Newsletter Themes:**

Fall 2002- Farmer Participatory Research  
Winter 2002- Livestock research

**Dale Bumpers Small Farms Research Center is a partnership among three institutions:**

ARS- conducts research related to livestock production and agroforestry; ARS staff can be reached at 479-675-3834.

PMC/NRCS- evaluation of vegetation and vegetation technology to retain soil and its productive capability; NRCS staff can be reached at 479-675-5182.

Division of Agriculture / University of Arkansas- dissemination of agricultural information. Extension Specialist, Billy Moore, can be reached at 479-675-5585.



**ARS scientists at DBSFRC and their primary research focus:**

**David Brauer-** Agronomist/Research Leader investigating both agroforestry and livestock production

**Glen Aiken-** Agronomist investigating production practices for stockers

**Adrian Ares-** Forester working on tree growth and physiology in agroforestry systems

**David Burner-** Agronomist investigating crop production in agroforestry systems

**Joan Burke-** Animal Scientist investigating reproductive performance in cattle and production practices for hair sheep

**Michael Looper** - Animal Scientist investigating beef cattle production

**Dan Pote-** Soil Scientist investigating the effects of management practices on sediment and nutrient retention in agroforestry and livestock production systems.

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## Organizations promoting agriculture in the Ozark Region

The information below is not an exhaustive list of organizations trying to help farmers and ranchers in the Ozarks. If your organization is interested in being included, please contact David Brauer.

**Poultry Production and Product Safety Research Unit** (PPPSRU)/ARS/USDA/Center of Excellence for Poultry Science is located on the campus of the University of Arkansas in Fayetteville. PPPSRU conducts research to solve problems related to: 1) diseases and physiological disorders that are of economic importance to the poultry industry; and 2) land application of waste from the poultry production. PPPSRU can be reached at 479-575-4202 or on the world wide web at [www.uark.edu/~usdaars/](http://www.uark.edu/~usdaars/).

**South Central Agricultural Research laboratory** (SCARL)/ARS/USDA conducts multi-disciplinary research for developing technologies to establish and sustain production and post harvest quality of alternative crops such as vegetables, small fruits, and kenaf. The Laboratory is co-located with the Oklahoma State University's Wes Watkins Research and Extension Center in Lane, OK. SCARL can be reached by phone at 580-889-7395 or on the world wide web at [www.lane-ag.org](http://www.lane-ag.org).

**Shirley Community Development Corporation (SCDC)** is a community-based organization formed to plan and initiate short- and long-term development programs for Shirley, AR and the surrounding communities. These programs focus on economic development, educational enhancement, youth job training, and service projects that improve and strengthen the community. SCDC is involved in projects that research and demonstrate the skills and techniques needed for production and marketing of specialty agricultural crops. The present focus is on log-grown Shiitake mushrooms. SCDC operates the Shiitake Mushroom Center as a training center. Recent additions include on-site production of garden bricks and stepping stones, raised bed herbal plots, twin wall polycarbonate greenhouse, and compost demonstration project. SCDC can be reached by phone at (501) 723-4443 or on the web at <http://www.shiitakecenter.com/index.html>.

**The Kerr Center for Sustainable Agriculture** in Poteau, OK offers leadership and educational programs to those interested in making farming and ranching environmentally friendly, socially equitable, and economically viable. The Kerr Center can be reached by phone at 918-647-9123, by email at [mailbox@kerrcenter.com](mailto:mailbox@kerrcenter.com) or on the web at [www.kerrcenter.com](http://www.kerrcenter.com).

**ATTRA, Appropriate Technology Transfer for Rural Areas**, is the national sustainable agriculture information center. ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other ag professionals. ATTRA is located in Fayetteville, AR. ATTRA staff members prefer to receive requests for information at 800-346-9140. ATTRA maintains a web site at [www.attra.org](http://www.attra.org)

**The Grassroots Grazing Group** (GGG) is a network of livestock producers mainly from northwest Arkansas but includes producers from many other states including Virginia, Missouri, and Oklahoma. GGG maintains a electronic mailing list on which members routinely share information and opinions regarding various topics on forage management and livestock production. Members meet monthly, usually at a member's farm, to see and discuss information related to grazing practices. Individuals interested in joining the GGG should contact Ann Wells at [annw@ncatark.uark.edu](mailto:annw@ncatark.uark.edu).

**The Center for Advancement of American Black Walnut** is a non-profit organization promoting the planting of an improved variety of eastern black walnut for nut production. For more information contact the Center's Director, Jim Jones, at P. O. Box 600,



## Dale Bumpers Small Farms Research Center

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Stockton, MO 65785, 417-276-6010 (voice), 417-276-6011 (fax), or [jonesctr@hotmail.com](mailto:jonesctr@hotmail.com) (e-mail).

Information regarding the **Arkansas Cooperative Extension Service and the Division of Agriculture** can be found on the internet at the following web site: [www.uaex.edu](http://www.uaex.edu).

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## Attention

Are you interested in a person to speak at a meeting of your civic or agricultural group? If so, please contact David Brauer at 479-675-3834 to see if we can match your interests/needs to the expertise of the Center's staff.

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If you did not receive this newsletter by mail and would like to do so, please contact the Center and we will place you on our mailing list.

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## Upcoming Events

The Arkansas Cooperative Extension Service and Natural Resource Conservation Service are conducting **grazing schools** this summer at the **Dale Bumpers Small Farms Research Center** location. Each school starts at 9:30 a.m. and adjourns at 3:00 p.m. Contact your local Extension agent for details.

August 27 - Matching Livestock Needs with Forage, Feed, and Water Resources

October 24 - Planning for Improved Fall and Winter Pasture

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## You can help us!

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